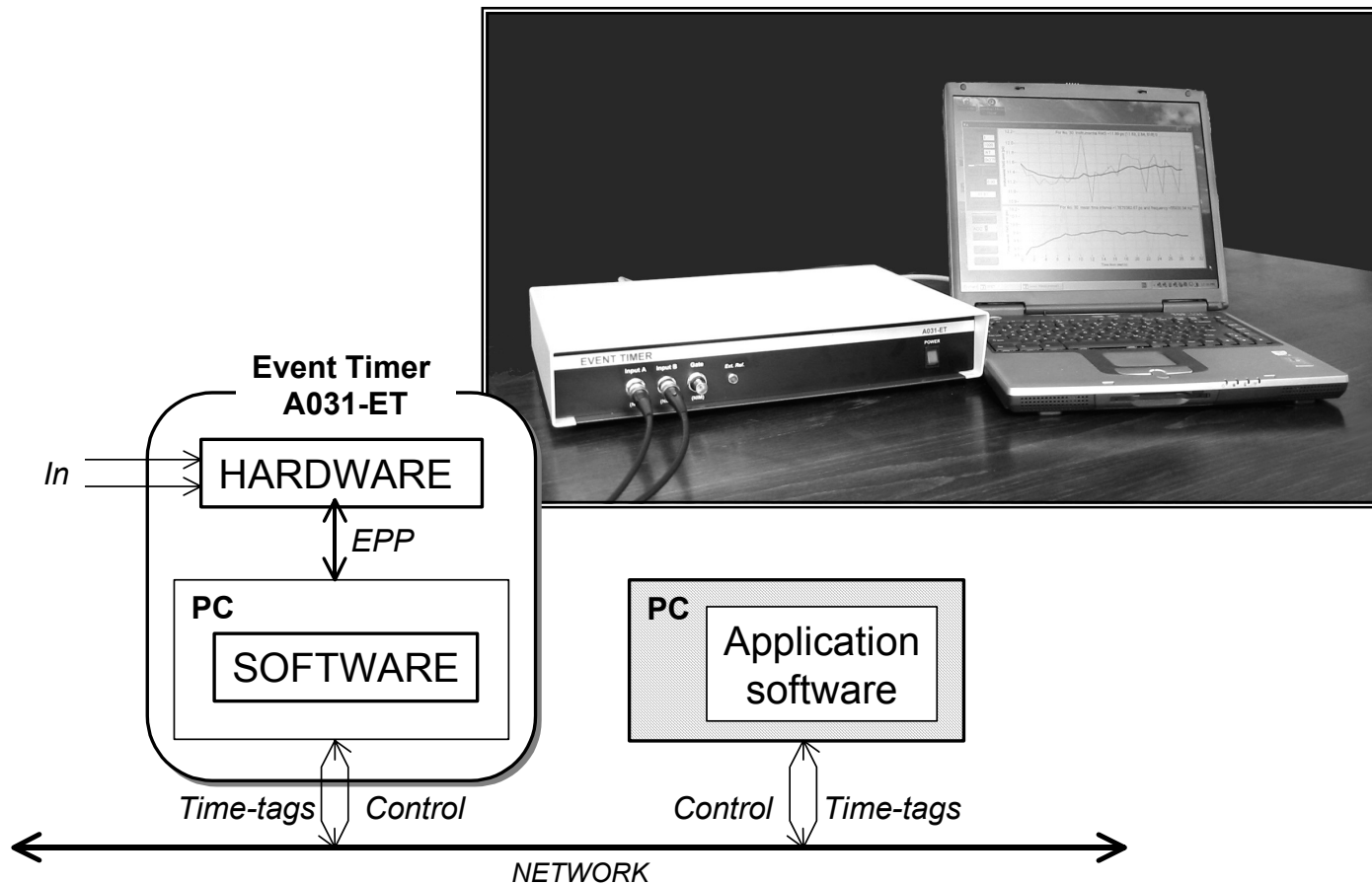

Evaluation of Event Timer A031-ET performance

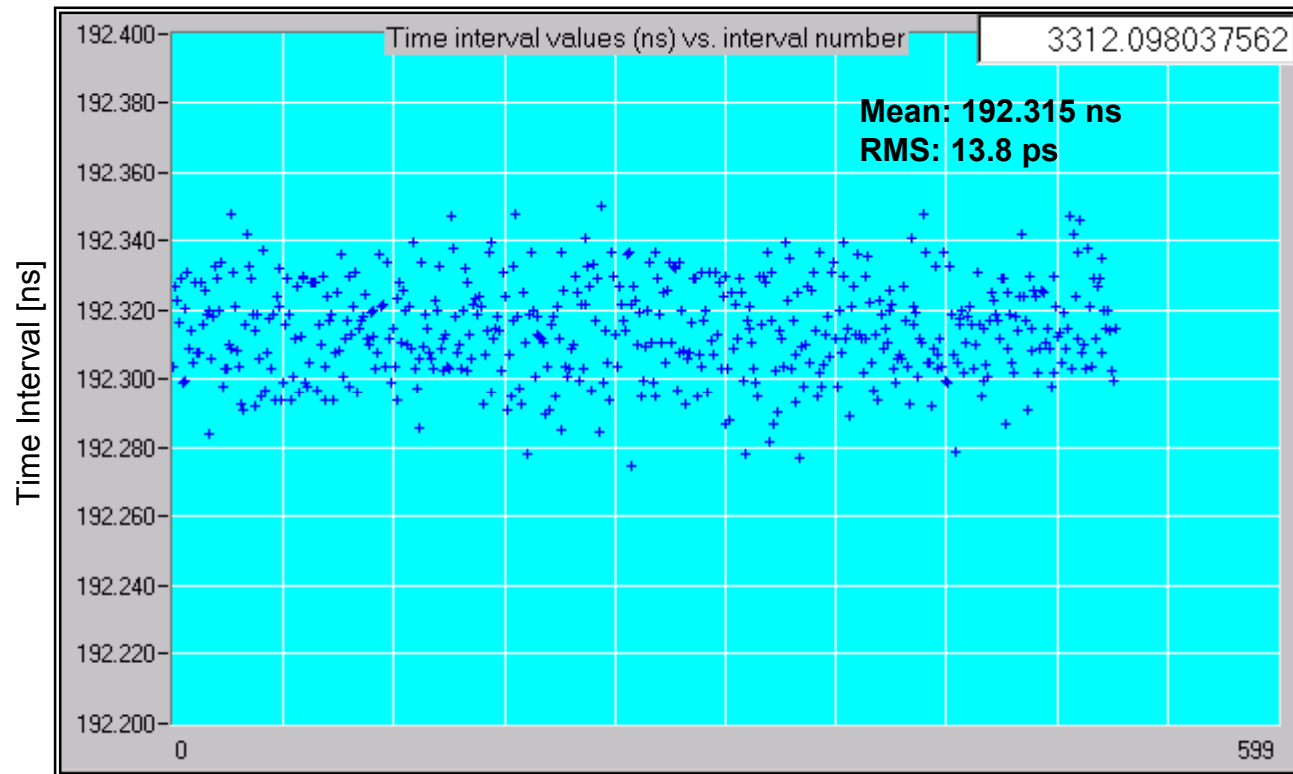
Yu. Artyukh
V. Bespal'ko
E. Boole

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University of Latvia. www.edi.lv
E-mail: artyukh@edi.lv*



Warming up: 3 hr
Inputs: NIM pulses, ~5ns/V falling edge
500 readings
Repetition rate: 10 Hz

Fixed cable delay measurement



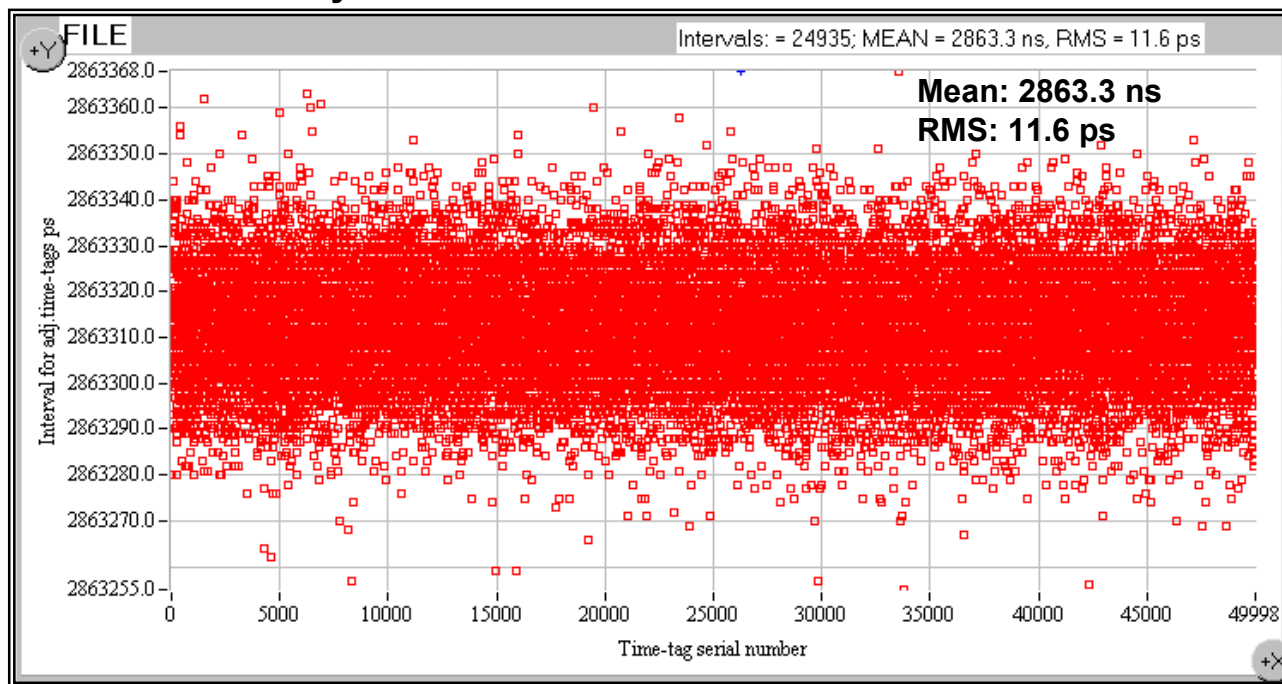
Warming up: 3 hr

Input: low-jittered NIM pulses, $\sim 2\text{ns/V}$ falling edge

24 935 readings

Repetition rate: 3.8 KHz

Crystal clock oscillator measurement

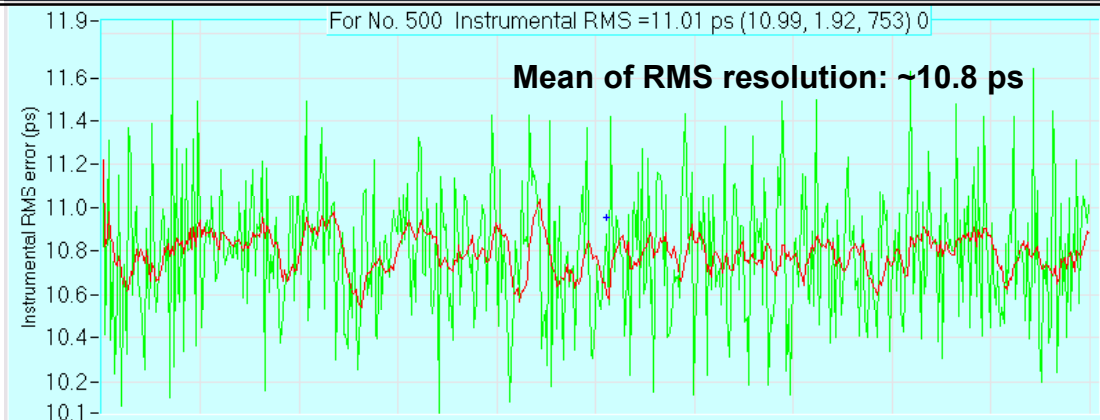


As a special feature, the A031-ET can provide two independent time-tags for the same event from some part of all input events. This is a basis for evaluation of A031-ET

true resolution using test signals with undefined instability.

RMS resolution versus time

RMS of differences between two independent time-tags for the same input event. Each points is calculated from 750 differences, every 2 s during 1000 s.



A031-ET PERFORMANCE EVALUATION

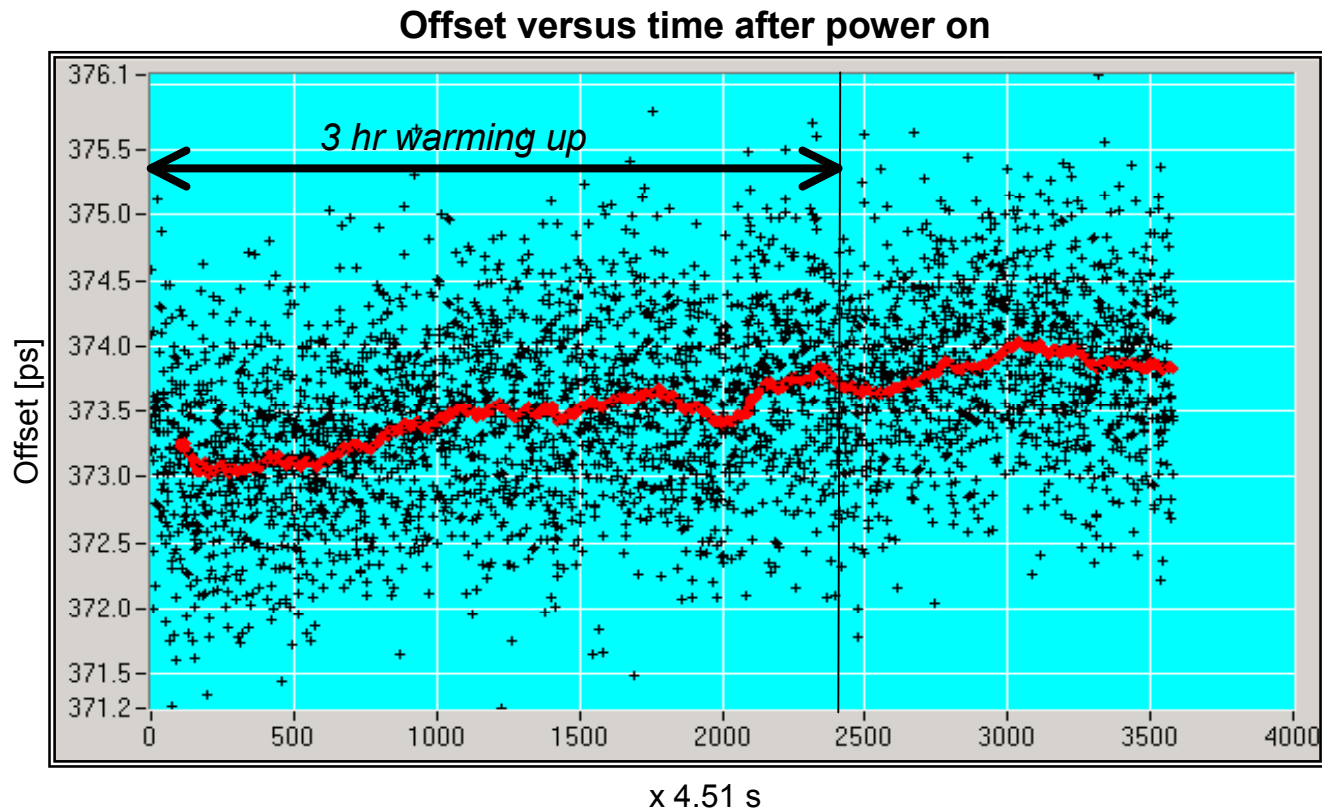
Temporal stability test

Ambient temperature 21 ± 0.5 °C

Temperature inside the case rises from 20 to 40 °C

Test duration: 4.5 hr

Each point is mean of 900 readings

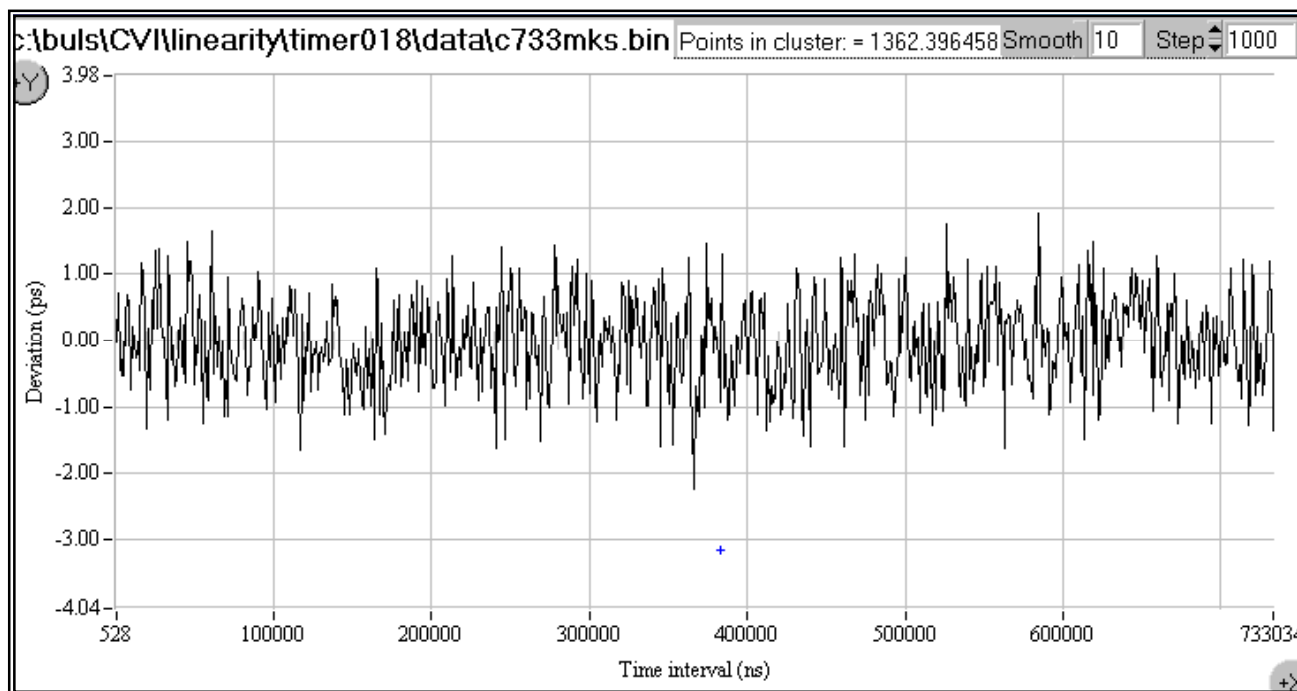


Riga, Latvia, 2003

Warming up: 3 hr

Evaluation error (RMS): ~ 0.45 ps

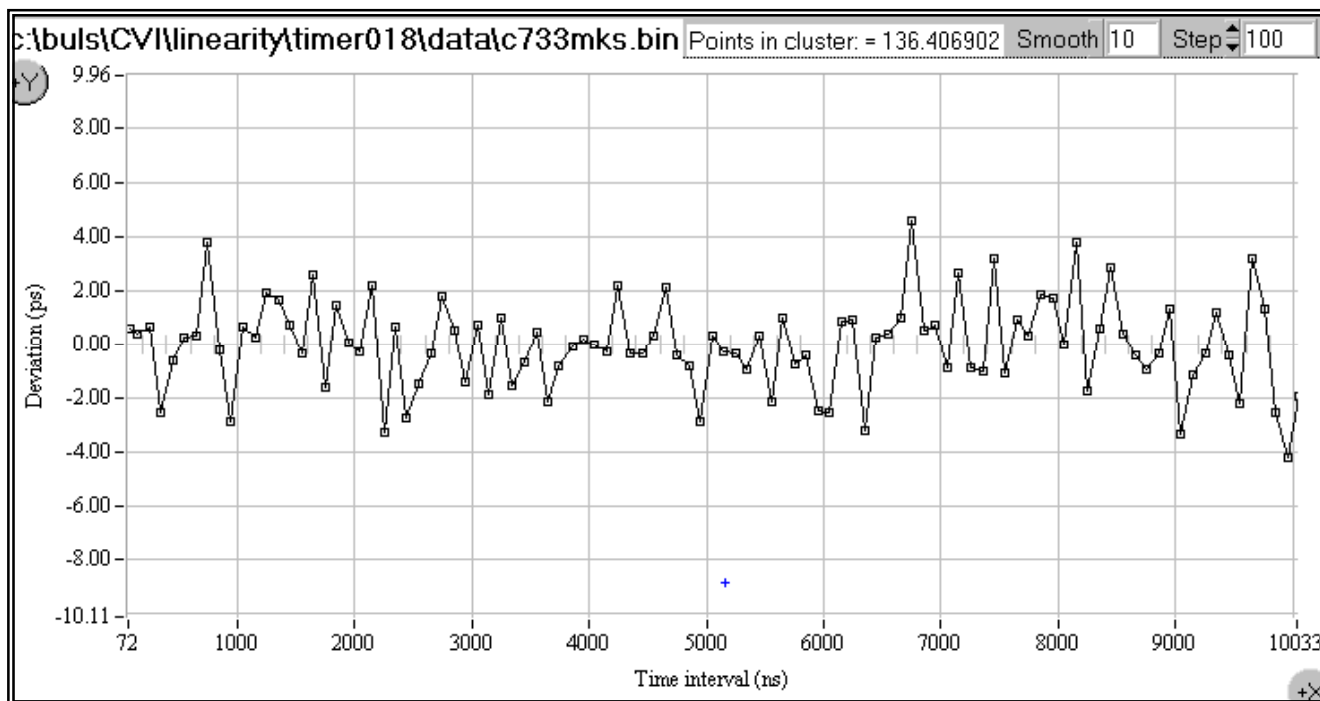
**Non-linearity error versus time interval (0.5 to 733 μ s range)
in combination with evaluation errors**



Warming up: 3 hr

Evaluation error (RMS): ~ 1.6 ps

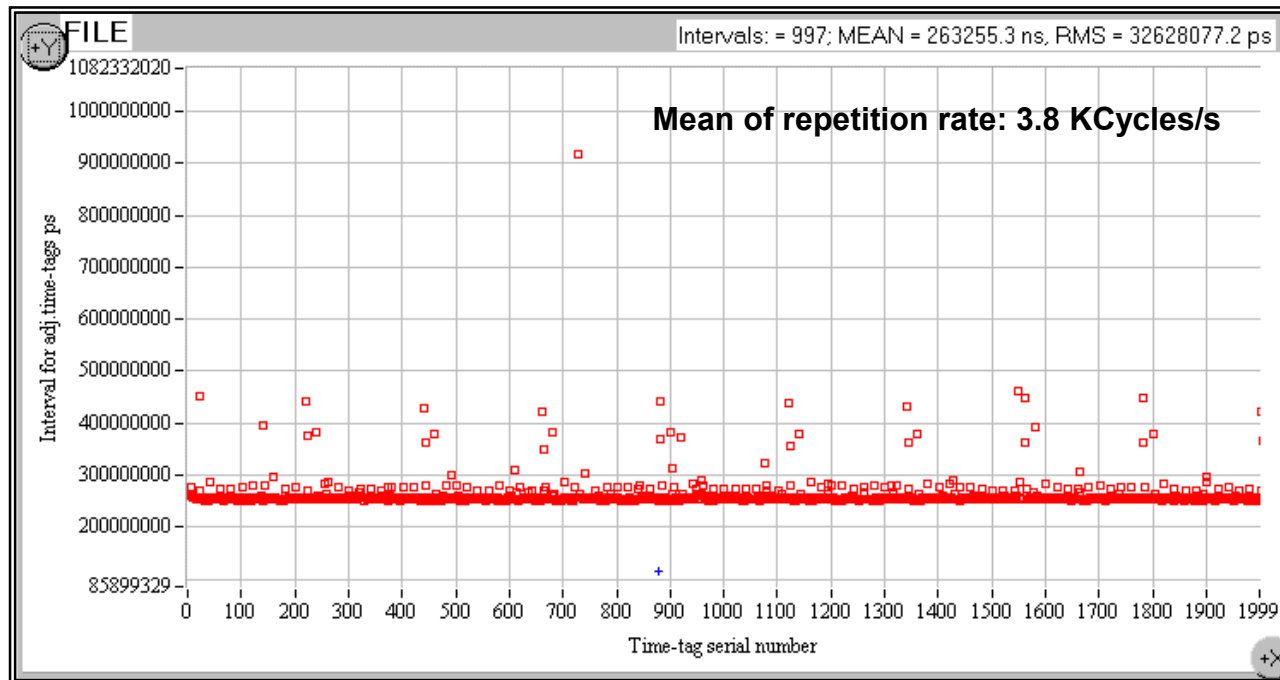
**Non-linearity error versus time interval (70 ns to 10 μ s range)
in combination with evaluation errors**



The A031-ET measures 2.8 μs time interval
in each cycle under internal triggering

Used PC: Pentium IV 1.8 GHz

Time intervals between adjacent measurement cycles



- | | |
|-----------------------------------|---|
| • LSB resolution | 1 ps |
| • RMS resolution (Jitter) | 10.8 ± 0.6 ps |
| • Non-linearity error | less than ± 1 ps |
| • Temporal stability | better than ± 0.5 ps/hr |
| • Temperature drift | less than 0.1 ps/ $^{\circ}\text{C}$ |
| • Maximum repetition rate: | mean - 3.6 KCycles/s
assured - 1 KCycles/s |